Trigger Counter & MID Alignment

Bruce Baller

September 20, 2005

Motivation

- See data/MC differences in $\nu\mu$ scattering angle, momentum distribution
  - Structure_functions.ppt (Aug 02, 2005)
- Confirm trigger/MID efficiencies

Check T1,T2,T3 Alignment

- Decode & reconstruct T1.T3 events
  - Fit hits in all SFT stations
  - Require DC track match
- Project tracks to T1,T2, T3 Z positions
- Plot residual for latched counters
  - Use X offsets and counter size from MC
- Do the same for 10k MC muons
- See 1.0 cm difference (trigr-b4.ps)
  - Construction error?

Fix T1,T2,T3 Alignment

- Shifted all counters by 1.0 cm in MC file geo_descr_all_per.dat
- Generate 10k MC muons
- Offset corrected (trigr.ps)

Check MID alignment

- Project CCmu muons to walls A,B,C
- Plot residuals with the fitted hits
  - See ccmu.ps
  - Only the central X and Y panels are decently populated
  - See 4 cm, 4.5 cm and 6 cm offsets in X view!
- I thought this was checked years ago

Fix MID Alignment

- Solutions
    1) Re-decode, re-reconstruct, etc all events (a major effort!)
    2) Read all events, shift MID X hits, re-do MID analysis, and write out (one time only)
- Used option 2
    - Updated histograms in ccmud.ps
    - Saved old files as .oldrft
- Corrected all alignment constants files
    - Data: Only used when re-decoding events

MID Alignment – MC fix

- MC MID residual plots are centered on 0 by design
  - geo_descr_all_per.dat used for truth hit creation
  - Offline alignment file used for reco hit creation
- Compared the lower/upper left/right edge of each MID panel
  - MC: After geo_descr_all_per.dat is read
  - Data: After l1acon.<run> is read
- Changed geo_descr_all_per.dat to match the data alignment constants files (~< 1 mm)

Effect on Trigger/MID efficiency

- MC jobs 10k CCe + CCmu
- Before
  - Trigger efficiency: 97%
  - CCmu MID tag efficiency: 73%
- After
  - Trigger efficiency: 97%
  - CCmu MID tag efficiency: 75%

Changes to # of CCmu events

- Old: 284 CCmu events in evlist

- Fixed bugs
  - Bsthit: Apply 10 cm –fiducial cut in non-readout direction
  - Tkfits: Handle case where kink fit p<10 GeV and swim fit p>10 GeV

- New: 285 CCmu events
  - Lost 4 events and gained 5